

## The contested politics of the Asian atom: a comparative analysis of peripheralisation and nuclear power in South Korea and Japan

Article (Accepted Version)

Park, Jinyoung and Sovacool, Benjamin K (2018) The contested politics of the Asian atom: a comparative analysis of peripheralisation and nuclear power in South Korea and Japan. *Environmental Politics*, 27 (4). pp. 686-711. ISSN 0964-4016

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/73201/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

### **Copyright and reuse:**

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

**The contested politics of the Asian atom: A comparative analysis of peripheralisation and nuclear power in South Korea and Japan**

**Introduction**

The nuclear power industry sits at a proverbial crossroads between renewed growth and accelerated decline. Heralded by advocates as being one of the few low-carbon electricity sources able to meet large-scale escalations in demand for energy services, the International Atomic Energy Agency reports that more than 60 countries have formally expressed interest in introducing nuclear power to their energy mixes. Meanwhile, traditional markets have begun to show some signs of revitalization with nations such as Canada, Japan, and the United States all investigating capacity additions or relicensing possibilities.

However, substantial obstacles related to the proliferation of nuclear weapons, financial viability, waste storage, and operational performance—to name a few—continue to contend nuclear power’s proclaimed benefits (Sovacool, 2010). As the Fukushima disaster illustrates, the technology is susceptible to catastrophic accidents, and adverse repercussions can be severe. For many of these reasons, the industry can face staunch resistance from the general public when it comes to building additional reactors or nuclear-related facilities.

Here, we contribute to debates over the future of nuclear power by highlighting a socio-political (and thus non-technical or non-economic) dimension often ignored: peripheralisation. Writing in *Environmental Politics* almost 25 years ago, Blowers and Leroy (1994) identified how a process of “social peripheralisation” made some communities ideal targets for the siting of nuclear power plants or nuclear waste storage facilities. According to their framework, peripheral communities tend to be (1) remote, (2) economically marginal, (3) politically powerless, (4) culturally defensive, and (5) environmentally degraded.

We apply Blowers and Leroy's framework beyond the UK and beyond only waste storage. Drawing from four case studies across South Korea and Japan, and a research design involving materials in three languages (English, Korean, and Japanese), our analysis suggests that social peripheralisation is both present and persistent. Peripheralisation results from insufficient access to information (i.e. the absence of an independent press), social apathy stemming from the existence of other priorities (i.e. economic growth aspirations), and even misinformation campaigns designed to positively influence public opinion. Furthermore, far from being neutral actors, our results strongly question the nature of public involvement. Although it may be true that in some cases local activists can stymie a national government's nuclear policy goals through lobbying and protest (Aldrich and Fraser, 2017), we find local leaders and even citizens can become arbiters of national policy and can themselves reinforce negative peripheral tendencies. Where previous work has suggested that peripheralisation is most connected to the more hazardous components of the nuclear fuel cycle such as reprocessing or high level waste (Parkhill *et al.*, 2010: 53; Solomon *et al.*, 2010), we find it also occurs throughout more mundane elements such as development planning, construction of reactors, permitting and siting, operation, fuel processing, and on-site storage.

To make this case, we first explicate our research design, consisting of case study selection and a systematic literature review, before elaborating the specific contours of peripheralisation across Ulju and Gyeongju (South Korea) and Futaba and Rokkasho (Japan). We discuss how pro-nuclear attitudes become "locked in" so that communities come to depend on the very processes that made them peripheral, and conclude that community dynamics, subnational struggles, and contests over local power relations may determine the future of nuclear power.

### **Background and conceptual approach: disempowerment and peripheralisation**

Discussions regarding social opposition to energy facilities often centre on broader policy rationales, “Not-in-my-backyard” (NIMBY) sentiments or “locally-unwanted-land-use” (LULU) situations. Blowers (2010) even writes that nuclear power facilities are a “defining example” of LULU facilities. For instance, many insightful studies emphasize how nuclear trajectories in Japan and Korea have been shrouded in secrecy, steered by centralized control over development, and connected to broader social and political goals such as military security or economic development (Jasanoff and Kim, 2009; Yoshioka, 2011; Sovacool and Valentine, 2012). Other studies show how in some marginal communities, short-term benefits such as employment, tax revenue and direct support by governments and utilities can convince people to accept nuclear related risks. Shimizu (2011) sees economically vulnerable communities in Japan hosting nuclear facilities to capture resources for regional development, a phenomenon also observed in Korea (Jang and Lee, 2008). There are therefore numerous claims that siting of nuclear facilities is conditioned by dimensions such as land prices, population density, and access to water (Lee, 2016; JAIF, 1970).

These approaches, while they have their strengths, suffer a core weakness in that they mainly focus on geographic, demographic, or economic aspects. Blowers and Leroy (1994) note that socio-political processes can be just as salient in conditioning where chemical plants, power stations, waste disposal facilities, and other major infrastructures are located. Blowers and Leroy (1994) and Blowers (1999, 2010, 2017) advance a concept of peripheralisation to explain how socially peripheral communities come to adopt LULU infrastructure. Drawing primarily from cases involving nuclear waste, their theory suggests that peripheral communities tend to be:

- *Remote*, either geographically separated from population centers or relatively inaccessible;
- *Economically marginal*, with most communities being homogeneous in terms of the social and demographic background and dependent on the nuclear industry as a dominant employer;
- *Politically powerless*, with most key political decisions being made elsewhere, often in metropolitan centers;
- *Culturally defensive*, with residents expressing ambivalent or ambiguous attitudes towards nuclear energy, combined with feelings of isolation and a fatalistic acceptance of nuclear activities; and
- *Environmentally degraded*, meaning residents tend to occupy previously polluted land or are close to places where radioactive risks are already present.

These five pillars of peripheralisation are tightly intertwined and dynamic. They perpetuate a cycle where the siting of an original facility can only intensify the extent of peripheralisation, and resultantly invite additional facilities, creating a feedback loop.

Peripheralisation theory admittedly draws from, or at least resonates with, diverse strands of academic thought. It connects with ecological modernization by suggesting how risk and environmental degradation can be minimized (Blowers, 1999); touches on the role of social movements, showing how they (and local institutions) can at times be excluded from decision-making processes (Blowers, 1999); focuses on politics and power relations, especially how inequality within and between communities results in uneven patterns of development, as well as issues of ethics and democracy, revealing how noxious facilities may be imposed on local groups (Blowers, 2010: 10); and overlaps with environmental justice frameworks, emphasizing

failures of due process or unequal distribution of costs and benefits in how “rural nuclear towns” come to be created (Otsuki, 2016).

Despite such synergies, peripheralisation theory still presents a unique perspective that at times deepens, and in some cases challenges, other approaches. For instance, tying together concepts from ecology, risk analysis, anthropology, and justice, Karlsson (2012) offers a powerful portrayal of inequalities that occur during nuclear accidents. A contribution peripheralisation makes is that even perfectly functioning nuclear reactors and facilities can invoke social or economic damage. Furthermore, rather than occurring as an accidental consequence—a misunderstood or chance phenomenon—peripheralisation can become a strategy that the nuclear industry uses, pragmatically and intentionally, to influence community decisions, indicating where sites are likely to be approved and accepted (Blowers, 2010). In addition, instead of emphasizing how national policies and incumbents can shape nuclear power processes (Johnstone *et al.*, 2017), peripheralisation offers a multi-actor framework underscoring the involvement and orchestration of multiple groups, including local councils, trade unions, business associations, electric utilities, national parliamentarians, and even international investors. Moreover, it offers context to the “site fights” debates and discussions (Aldrich, 2008; Dusinger and Aldrich, 2011) surrounding nuclear power licensing and public participation, showing how they are grounded in deeper, more multi-scalar structures of inequality. Also, peripheralisation emphasizes variation in local and national context—for instance, nuclear infrastructures in Finland or Sweden do not appear to fit the framework (Nucci and Brunnengraber, 2017).

Finally, the theory demands we think more critically about, and question the desirability of, “community” or “local” action. Tolerability to nuclear risk is neither stable nor uniform (Parkhill *et al.*, 2010). Zonabend (1993) offers a classic examination of the La Hague nuclear waste processing plant in France, demonstrating how patterns of silence and denial can cement

unfair development patterns and render local actors impotent. As we will see in our cases, however, in Japan and South Korea nuclear activities can be actively propagated by exuberant local actors who are far from silent when they advance alluring promises, manipulate public opinion, or proclaim their support. Thus, although it appreciates the multiplicity of actors, peripheralisation reveals the dynamic and complex nature of local nuclear politics. It confirms, as Dunsberry and Alrich (2011: 685) write, that local residents are “not just [...] passive receivers of government plans but also as active agents in their own right.” Notably, peripheral communities are not always powerless, nor is the influence between the periphery and the centre unidirectional: communities dependent on the nuclear industry can quickly create an industry dependent on particular communities (Blowers, 1999). As Blowers (2010: 163) intimates, “the process of peripheralisation, therefore, is one of push and pull, a mutually reinforcing process.”

## **Research Methods and Design**

As we more rigorously test peripheralisation theory, this section of the paper briefly justifies our selection of four case studies in South Korea and Japan. It also explains our primary method of data collection, a systematic review of materials in English, Korean, and Japanese.

### *Case study design*

The qualitative research methodology literature, especially when applied to the fields of political science or politics, suggests that case studies can differ in their type, unit of analysis, and uniformity (Gerring, 2004; Gerring, 2005; Seawright and Gerring, 2008). In that vein, we analysed a set of cases as our unit of analysis rather than a single case—leading to comparative cross case analysis. Such comparative analysis is ideal for testing or confirming a hypothesis and examining causal effects beyond a single instance. In terms of type, we sought a combination of typical yet diverse cases. Typical case studies study common, frequently

observed, and/or representative cases, and exemplify a stable, cross-case relationship. Diverse cases attempt to demonstrate maximum variance along a relevant dimension, so that they illuminate the full range of important differences. Our cases are therefore typical but not identical, as they vary in some of their features (types of nuclear infrastructure, geographic location and proximity to urban areas, local economic structure, etc.). A third methodological dimension considered was whether a case (or cross-case comparison) requires temporal or spatial variation. We decided spatial variation across different countries was useful as it reflected diversity, and that temporal variation across different timeframes was useful to permit more natural (less artificial) boundaries around our analysis. Although we examine only four cases qualitatively, we maintain that such a “small n” study can still result in “big conclusions” (Lieberson, 1991).

We selected four South Korean and Japanese communities as cases. At the national level, both countries exhibit a long history of nuclear development. Table 1 indicates that the two countries have six of the top ten largest nuclear sites in the world. Moreover, nuclear facilities in both countries involve multiple parts of the nuclear fuel cycle (uranium compression, low level of radioactive waste storage, high level of radioactive waste storage, reprocessing facilities and mixed oxide fuel manufacturing, to name a few). Operators of nuclear facilities in both countries, such as TEPCO (Tokyo Electric Power Company), JNFL (Japan Nuclear Fuel Limited) and KHNP (Korea Hydro & Nuclear Power), therefore have established deep connections with the state and local actors. Lastly, both countries are areas where the nuclear industry is expected to grow significantly (IAEA, 2017; MOTIE, 2015).



**Table 1: Ten largest nuclear power sites in the world**

Country	Nuclear cluster	Number of facilities	Capacity (MW)
Korea	Kori	8 (10)	10,452
Canada	Bruce	8	6,700
Japan	Kashiwazaki Kariwa	7	9,096
Korea	Hanul	6 (10)	6,216
Korea	Hanbit	6	6,197
Korea	Wolsung	6	4,809
China	Hongyanhe	6	6,183
Ukraine	Zaporizhzhia	6	6,000
France	Gravelines	6	5,706
Japan	Fukushima Daiichi	6	4,700

**Notes:** Figures in parentheses contains under construction facilities.

*Source:* Amended from IAEA (2017)

Of course, despite these similarities, the two national contexts are not identical (Yun *et al.*, 2010; Aldrich, 2010). Valentine and Sovacool (2010) note that in Japan, the country's industrial policy was driven by the elected Liberal Democratic Party, whereas South Korea was a military dictatorship during the nascent years of its nuclear program. In Japan, energy policy was consolidated at the national level and nuclear electricity generation was initially approved for only three utilities, Tokyo, Kansai, and Chubu, whereas in South Korea, the Office of Atomic Energy was placed directly under the President and the nuclear program was structured as a monopoly under the Korea Electric Power Corporation. More recently, both nations have shown distinctive reactions to the Fukushima accident, with it shocking the Japanese system but having negligible impact on perceptions in Korea.

Within each country, we focus on two separate communities: Ulju district and Gyeongju city for Korea, and Futaba district and Rokkasho village for Japan. As Table 2 summarises, these four regions have at least two nuclear-related facilities (including those that are in operation or in the process of being constructed). In Korea, Ulju is home to the Shin Kori-3 reactor as well as three others under construction. Gyeongju hosts six reactors as well as a radioactive waste disposal facility. In Japan, Futaba is home to the Fukushima Daiichi nuclear power plants which include reactors and spent fuel facilities. Rokkasho has facilities for high level nuclear waste, reprocessing, and mixed oxide fuel fabrication. This selection of cases was determined not only by these nuclear facility dynamics, but also availability of data.

**Table 2: Summary of four nuclear communities in South Korea and Japan**

Korea			Japan	
	Ulju	Gyeongju	Futaba	Rokkasho
<b>Facilities</b>	Shin Kori-3 operating reactor and 4/5/6 under construction	Six nuclear reactors and Low/middle levels of radioactive disposal facility	Fukushima Daiichi Nuclear Power Plants	Uranium enrichment; Low and high level of nuclear waste storage; Reprocessing; MOX fuel fabrication

<b>Capacity</b>	1,400 MW	4809 MW/ 1000 drums	4680 MW	1830 canisters of high-level radioactive waste
<b>Location</b>	West of Ulsan city	East southern of Gyeongsangbuk-do	Middle of Hama Street in Fukushima prefecture	Kahoku peninsula in Aomori prefecture
<b>Area</b>	756km <sup>2</sup>	1324.29km <sup>2</sup>	865.71km <sup>2</sup>	252.68km <sup>2</sup>
<b>Population</b>	219,201	258,280	65097	11,095

*Source:* Amended from FEPC (2016) and KHNP (2016)

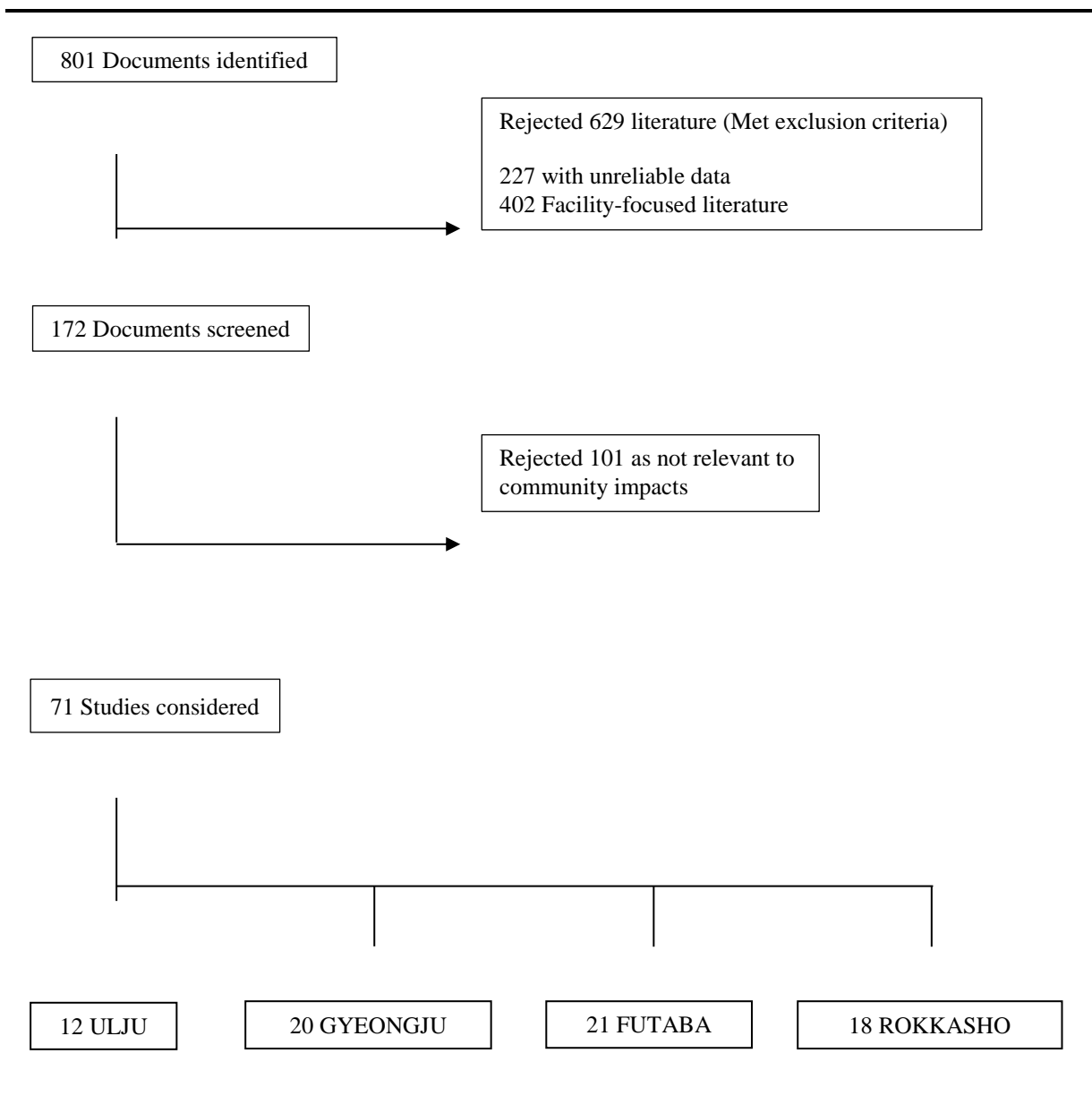
### **Method of analysis: systematic review**

To assess the extent of peripheralisation in our four cases, our primary method was a systematic review. As Petticrew and Roberts (2006: 9) describe:

Systematic reviews are literature reviews that adhere closely to a set of scientific methods that explicitly aim to limit systematic error (bias), mainly by attempting to identify, appraise and synthesis all relevant studies (of whatever design) in order to answer a practical question (or set of questions).

In this context, we proceeded to collect more than 800 initial documents published in English, Japanese, and Korean (Figure 1). After analysing the material for only those that focused on the socio-political, economic, or environmental impacts on communities (positive and negative) with the keyword searches summarized in Appendix I, 71 sources were selected for analysis, many of which we cite in the paper. Appendix II offers a full list of these sources by location.

**Figure 1: Systematic review methodology utilized in this study**



Source: Authors

### Results and Discussion: The contours of peripheralisation across four cases

This section presents our results from the systematic review analysis, framed through the conceptual lens of peripheralisation. Each case study subsection follows the same structure: a brief summary of the nuclear facilities onsite, and then more elaborate historical discussion of how peripheralisation has occurred (or continues to occur). Table 3 offers an inductive summary of our findings.

**Table 3: Summary of social peripheralisation across four case studies**

Korea			Japan	
	Ulju	Gyeongju	Futaba	Rokkasho
<b>Geographical remoteness</b>	On the edge of Ulsan city, isolated and lacking access to urban areas	Relatively well equipped transportation infrastructures and accessibility to urban areas	In an isolated and inaccessible region in Japan	Remote, not only from the urban city, but also from the centre of Aomori prefecture
<b>Economic marginality</b>	Achieved partial industrialisation but they aim to invite further	Relies on its revenue from the tourism industry, but strict regulation	Agriculture-based industry, pockets of extreme poverty.	Agriculture, fishery and dairy are main industries, requested poverty

	industry	and national		aid under the
	infrastructures	industrial policy		national
		constrain further		development
		development.		plan.
<b>Environmental degradation</b>	Located next to Gijang district, which has six nuclear reactors, they already share the risk of nuclear facilities.	Has six nuclear reactors and high-level radioactive waste within the community.	Home to the Daiichi Nuclear Power Complex, now largely contaminated by the Fukushima accident.	Plans to host nuclear facilities starting with Mutsu
<b>Political powerlessness</b>	Coalition between local politicians, especially the governor, and national government strictly discount community voices.	Local government subordinated to national development interests	Close alliance between utility and local politicians	Local voices mostly ignored by both local and national governments.

<b>Cultural acceptance</b>	Fatalistic	Deep-rooted	People to	People have
	dependence on nuclear related facilities.	sense of discrimination and financial difficulty.	regard nuclear facilities as a part of daily life.	mostly internalized the risks of nuclear infrastructure.

---

*Source:* Authors

*Ulju town (Korea): Kori nuclear complex*

The Kori nuclear complex, spread across the Kori and Ulju villages, is one of the major nuclear clusters in the world. There are six reactors in Gijang district (Kori-1/2/3/4 and Shin Kori-1/2), with two more planned for construction, Shin Kori-7/8. There is one operating (Shin Kori-3) and three under construction (Shin Kori-4/5/6) in Ulju district. In 2022, when three additional reactors are expected to be completed, it could boast 10 GW of capacity.

The history of the construction of the Kori-1 nuclear power plant can be summarized by a single objective of the state: To achieve self-reliance in energy for development. The Kori region was chosen as for the nation's first nuclear power plant due to its remoteness and low population (Lee, 2016), and the reactor was completed in April 1978 with a 580 MW capacity. Kori has since spawned a nuclear backbone of eight nuclear reactors, meeting the objectives of the Fifth Basic Plan of Long-Term Electricity Supply and Demand.

**Figure 2: Location of Kori, Shin Kori, Wolsung and Shin Wolsung nuclear power plants**



Source: KAIF (2017)



First, geographic remoteness plays a strong role in the location of nuclear infrastructure. The greater Ulju region can be divided into three areas: Western, Middle, and Southern. The Western and Middle villages have relatively well-equipped external transport networks, such as the KTX (Korean bullet train) and rail infrastructure, which are lacking in the Southern area (Ulsan Development Institute, 2014). This ‘internal periphery’ distances Kori from ‘mainstream’ population centres.

Second, Ulju shows a degree of political powerlessness, with aggressive protests against government plans. For example, people in Seosyneg-meyon collected and submitted a petition containing thousands of signatures of local residents against KHNP and the Ministry of Trade, Industry and Energy (MOTIE). However, it was ignored. KHNP maintained the resolute stance that the project would progress, despite local opposition, in order to protect national interests (Lee, 2003). When campaigning in 2006, Governor candidate Um ChangSub (subsequent Governor of Ulju) affirmed: “It seems impossible to rescind the national-led nuclear projects” (Nocut News, 2006).

Third, the economic marginality of Ulju is reflected in the history of how the facilities came to be located. For the people in Ulju, the decision to site the Shin Kori-3 reactor was unexpected because it was intended to be built in Hyoam in the Gijang region. However, intense local protests in Gijang and an enthusiastic appeal by Park JinGu, then governor of Ulju district, convinced national planners to change their minds (Hwang, 1998), and to offer a generous compensation package (Han 2012: 60). Local concerns about property prices and deflated land values were countered with the passage of the *Act on Assistance to Electric Power Plants-Neighbouring Areas* in 2008 (Ulsan Press 2007). Due to these accumulating financial benefits from the Shin Kori 3 and 4 reactors, Ulju requested two more reactors (Shin Kori 5 and 6) in 2013. As Park JinGu clarified when explaining the decision, ‘closeness to Kori already means we (Ulju) share a certain amount of risk of nuclear energy, so it seems a better choice to host

another reactor in our region for economic compensation and regional development' (Han, 2012: 60). Following this decision, the community received an estimated ₩910 billion (approximately \$80 million) from the KHNP, with further regional money promised for stimulating regional economic development and constructing infrastructures (Kim, 2016). Kong and Lee (2017) estimate that constructing the two reactors will bring the community an additional 3,000 jobs and as much as \$177 million in infrastructural investments.

Despite these efforts at reversing the economic marginality of the region, we see the entrenchment of patterns of environmental degradation. The continued operation of reactors and related facilities have generated thousands of tons of radioactive waste accumulating there, as well as thermal pollution from cooling cycles disrupting water quality and flow (Kim and Ahn, 2006).

Finally, the residents of Ulju are culturally defensive and strongly in favour of nuclear power as a cornerstone of local growth. This phenomenon was illustrated when President Moon JaeIn (temporarily) decided to stop the construction of Shin-Kori 5 and 6. Lee SanDae, head of the association of local residents, underscores social acceptance of the 'nuclear-centred energy industry complex':

Whilst local people intensively opposed the siting of Shin Kori 3 and 4 reactors, it was short-lived. Over time, we acknowledged that we cannot make any changes in case of Shin Kori 5 and 6 plants, and decided to cooperate with siting. We have accepted as a way of life that we must contribute to regional advancement through co-existence with the nuclear power facilities. (Lee, 2017)

To borrow from Blowers and Leroy, the community has come to accept, and now reinforces, its own peripheralisation.

*Gyeongju city (Korea): low/middle level of radioactive waste disposal*

Since the national government established its *Basic principles for nuclear waste management* in 1984, there have been numerous attempts to site nuclear waste disposal facilities in Korea, Table 4. As a result, Gyeongju was selected in 2005 as the formal permanent site, following a favourable local referendum.

**Table 4: Historical attempts to site radioactive waste facilities in South Korea**

Period	Candidate Sites	Result
1986-1989	Yongil, Ulchin, Yongduck	Cancellation by local resistance
1990	Anmyondo	Cancellation due to media leakage
1991-1993	Tae'an, Youngil, Ulchin, Sanhun, Gosung, Yangyang	Aborted due to local resistance
1993-1994	Yongsanmyun, Janghun and Gisungmyun, Ulchin	Aborted due to local resistance
1994-1995	Gulupdo	Discovery of an active fault
2000-2001	Yeonggwang, Ganjin, Jindo, Gochang, Boryeong, Wando, Uljin	No application

<b>2003</b>	Yongjuck, Ulchil, Yeonggwang and Gochang	No application
<b>2003-2004</b>	Wyeodo, Buan	Aborted due to local resistance and negative local referendum
<b>2005</b>	Gyeongju, Gyeongsang, Yeongdeok and Pohang	Gyeongju is selected as official site through the local referendum

---

*Source:* Amended from Leam (2015: 175)

In terms of geographic remoteness, Gyeongju lies in the northeast corner of the Korean Peninsula, well known as the capital of the Shilla dynasty for nearly a century. Because of this historical background, it has been called a treasure house of historical and cultural assets in Korea. In this sense, Gyeongju relies highly on the tourism industry and related service sectors. To manage its historical wealth, the government set strict regulations about urban development and planning, such as height and structural limitation for buildings.

However, these so-called ‘Culture belt’ regulations have restricted economic activity. They have been a stringent obstacle for regional development and urban planning for Gyeongju, and have given rise to deeply-rooted resentment towards national government, and aspirations for self-reliance and local development to overcome regional discrimination (Chae, 2004).

Taking these regional disparities into account, the then Mayor of Gyeongju, Baek SeungJu, announced his intention to host a radioactive waste storage facility in August 2005 to secure monetary support from both the national government and KHNP. With three other

communities also offering invitations—Pohang, Gunsan, and Yeongduk—the siting process was seen as competitive and highly desirable. It was even framed in terms of equalizing regional economic discrimination. As one resident in Gyeongju stated just after the result of local voting:

Because we failed to invite the Taekwondo Park and racecourse through political discrimination, people bonded together not to miss the nuclear waste repository project this time. (Kim and Park, 2005)

Gyeongju may very well have viewed hosting the radioactive waste project as a ‘last chance’ to escape structural inequality. During the negotiations, the national government even promised the ‘boom’ of regional economic growth by committing to reinvesting the benefits from the nuclear waste business. These guarantees resulted in a significant improvement of local acceptance (Chung and Kim, 2009).

This approach has produced a number of negative social and environmental community impacts, especially after the invitation. For example, the safety of the facility was called into question: according the Korean National Assembly in 2013, 74% of the land for the location was in ‘faulty’ condition (Nam, 2013: 51-52); construction was postponed several times. In September 2016, the largest earthquake in Korean history heightened safety concerns and delayed completion to at least 2020. Yun (2006: 27) argues that the government was so obsessively absorbed with achieving policy goals and financial inducements that they may have neglected safety aspects, even though safety should have been perhaps the primary factor in determining the siting of the facility.

Gyeongju therefore exhibits the presence of multiple dimensions of peripheralisation beyond remoteness; economic marginality played a central role in convincing the region to host a radioactive waste repository. Facilities at Gyeongju contribute to the local economy through

taxation and employment; KHNP and KEPCO KPS account for approximately 10% of regional employment (KHNP, 2016: 639).

In terms of political powerlessness, the siting of the facility illustrates the political disparity between centralized and local authority (Cho, 2007). Whilst local voting seems to be an advanced and democratic process compared with previous events, it fits into a national strategy of 'self-sustained development'. This strategy proposes that local government discovers their own attractiveness or competitiveness and then seeks support from the national government. Although based on the principle of decentralisation of power, it can also be interpreted as dependence on central government, especially as Gyeongju failed to win two other national projects it applied for. Such pressures may have manipulated the community into thinking accepting the waste project and committing to further future development was its 'only chance' for growth (Ha, 2016). As such, Gyeongju and Gyeongsanbuk both have plans to build further nuclear facilities such as research institutes (Hwang, 2016).

Environmental degradation also features prominently. Existing reactors adopted a Canada Deuterium Uranium (CANDU) design that produces a larger amount of onsite plutonium compared to other designs, exposing Gyeongju to the accumulating risks of nuclear waste. Furthermore, the government recently announced plans to add more dry casks for nuclear waste from these CANDU reactors as existing capacity is estimated to be exhausted by 2024, creating local controversy around environmental safety and stewardship (Lee, 2017).

Finally, we see cultural defensiveness, and a normalization of risk. In this context, Gyeongju might be more attenuated to nuclear waste than any other community in South Korea. One local inhabitant even likened the repository to a safely parked car:

Radioactive waste repository is the parked car, which seems much safer than running one (operating reactor); hence, I cannot understand why people oppose the parked car.

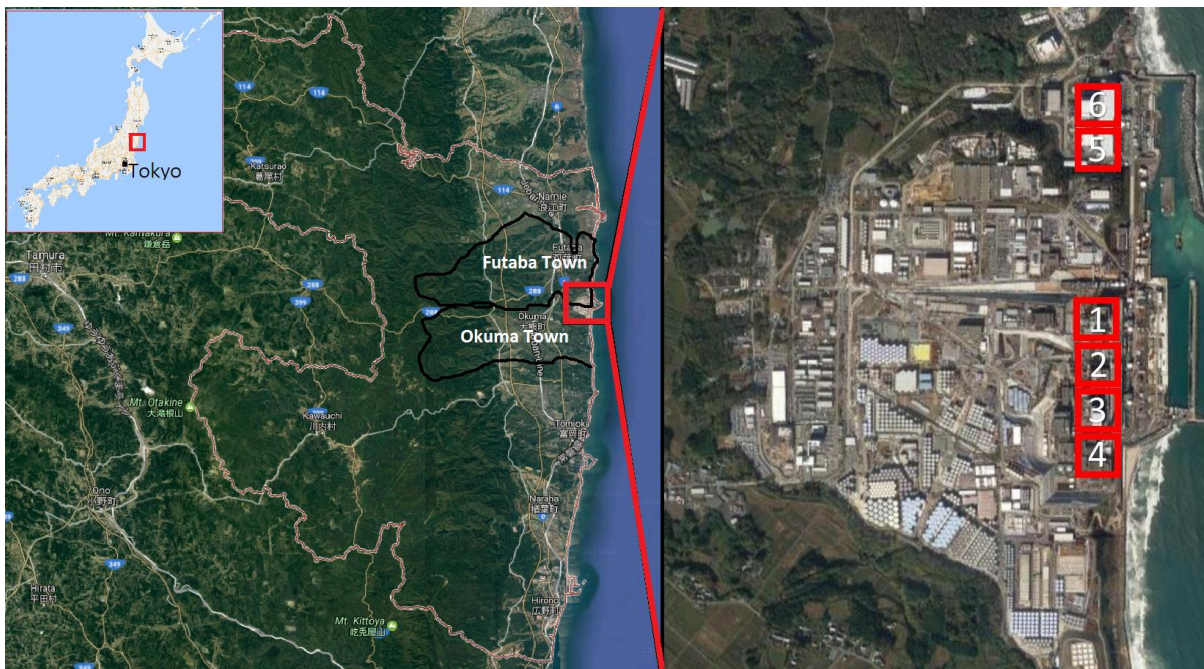
(Yang, 2016: 141)

Local identity has thus become fused with a proclivity to accept NIMBY and LULU facilities.

*Futaba district (Japan): Fukushima nuclear reactors*

The Fukushima region illustrates well the general characteristics of Japanese nuclear development and siting. Prior to the March 2011 accident, there were six reactors at the Fukushima Daiichi nuclear power plant station (Fukushima 1) and four reactors in the Daini cluster (Fukushima 2). As the scale of the cluster shows (Figure 3), Fukushima was claimed to be the core of the nation's *Genpatsu Ginza* (Nuclear Plaza), and remains one of the largest nuclear clusters in the world.

**Figure 3: Location of Fukushima Daiichi nuclear power plants**



Source: Authors

The history of Fukushima is often traced to Kimura Morie, then member of the Japanese House of Representatives, who encountered atomic energy at the Helsinki Exposition in August 1955 (Fukushima Minpo, 2013). Kimura and Sato Kiichi, governor of the Fukushima prefecture, subsequently initiated discussions with Kigawada Kazutaka, a Fukushima-native and vice-president of TEPCO, to build a nuclear project. Kigawada accepted the request, finally deciding on the territory bordering the towns of Futaba and Okuma in the mid-1960s. From then on, as TEPCO put it, “Fukushima expressed a strong willingness to be an industrial city, and also presented the blueprint of nuclear plan to us” (TEPCO, 1983).

In this light, one of the central aspects of peripheralisation, geographic remoteness, was seen as an incredible advantage:

220km northward from Tokyo, Fukushima is located almost in the middle of the Pacific; it has an area of 320m<sup>2</sup>. The closest household is nearly 1km from the reactor and the population rate is low. Naniwa village, which has a population of 23,000, is 8.5km away from the reactor. (JAIF, 1970)

Tanaka Kakuei, Prime Minister of Japan in the 1970s, would later even comment that the country’s nuclear strategy amounted to:

Build it in rural places instead of Tokyo and send the electricity here. We can send the money for it. (Shimizu, 2011: 25)

Its remoteness was therefore an indispensable factor in determining the location of the cluster. Equally important is the economic marginalization of the predominantly agricultural Futaba



area, with farming accounting for more than 60% of economic activity. Although many local people subsisted on agriculture and the fishery industry, *Dekasegi* (going to other cities for work) was a daily routine for many members of the village, especially in the winter. Accordingly, TEPCO stressed that nuclear facilities would make the community ‘free from *Dekasegi*’ (Fukushima Minpo, 2013). Nuclear construction was seen as a direct and almost immediate antidote to economic backwardness, giving local residents the impression that ‘Fukushima is becoming the city’ (Fukushima Minpo, 2013).

In 1974, *Three Power Source Development Laws* introduced a new tax mechanism for nuclear waste, offering additional revenue to nuclear communities and softening remaining social opposition (Agency for Natural Resources and Energy, 2010). Via these schemes, Okuma experienced significant growth in the 1970s; nuclear-based income constituted 90.7% of total local revenue in 1975 (Yamakawa, 1987). The situation in Futaba was similar, with roughly half total revenue coming from nuclear assets (Koike, 2013). Nuclear power resulted in economic spill-over effects in construction and services, including restaurants, cleaning services, and hairdressing (Kono, 2002). For decades afterwards, roughly half of Futaba's total revenue came from nuclear assets (Koike, 2013).

The entire regional economy consequently became dependent on nuclear infrastructure, creating a ‘monoculture’. The nuclear industry provided employment; facilities provided about 7,000 jobs in the 1980s, and one fifth of local residents work on the nuclear-related occupations (Yamakawa, 1987). This shifted the bulk of community attitudes from ambivalence to support. Futaba town council argued:

Whilst most local people were surprised and hesitant to accept nuclear development, the community's enhanced financial situation changed the atmosphere towards embracing it. (Hagami, 2011: 189)

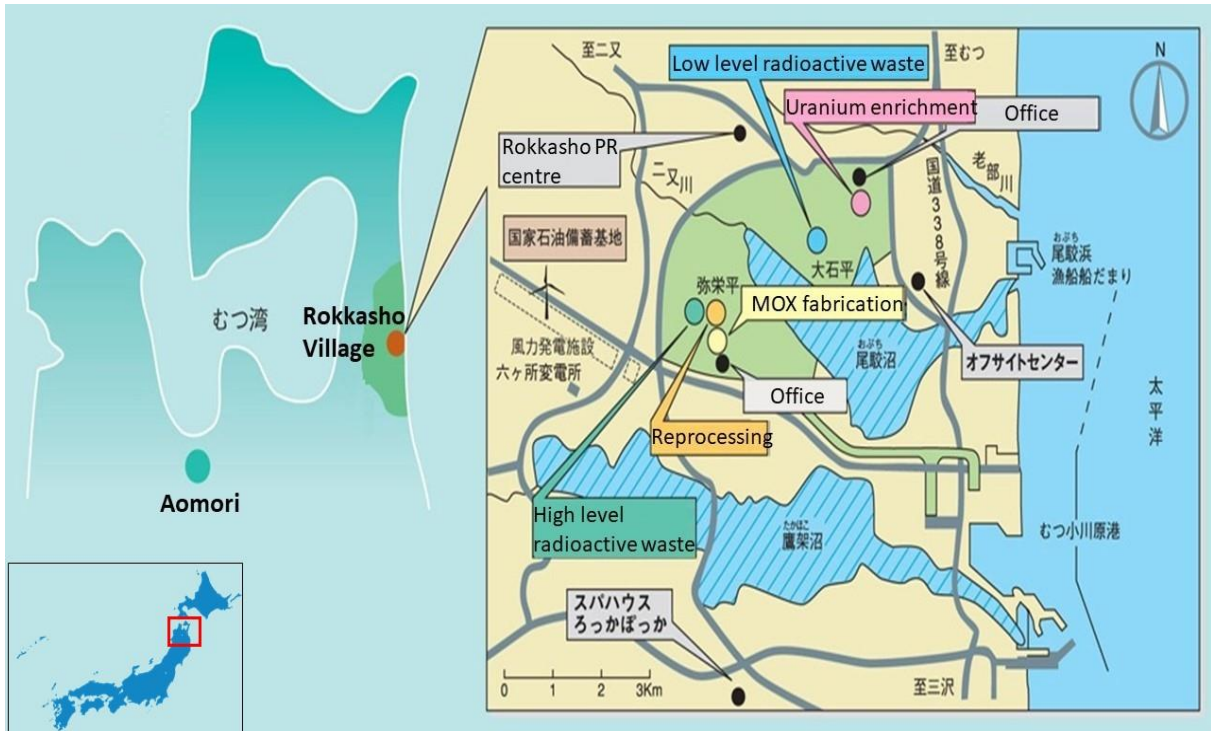
Sato Eisaku, former governor of Fukushima between 1988 and 2006, likened this situation to ‘drug addiction’ (Koike, 2013).

The Futaba example demonstrates the importance of looking beyond individual communities when discussing peripheralisation, revealing how the centre (Tokyo, TEPCO, bureaucrats) essentially tried to colonize rural areas to maintain their own mass consumption lifestyle and power. The electricity from Fukushima and other marginal regions was transferred to urban cities, separating and socializing the benefits (clean kWh) from the risks (accidents, local pollution). Shimizu (2011: 34) aptly notes that Japanese nuclear energy policy therefore typifies a ‘structure of discrimination’ between central and marginal areas.

*Rokkasho village (Japan): nuclear fuel cycle facilities*

Rokkasho village is located in the northeast peninsula, the so-called *Shimokita-hantou* (Shimokita peninsula) in Aomori prefecture, Japan. As Figure 4 shows, Rokkasho town is extremely isolated, not only from Tokyo, but also from the centre of Aomori, which is likely why it has become a home for the reprocessing and storage of nuclear waste.

**Figure 4: Distribution of nuclear facilities in Aomori Prefecture**



**Note:** Five facilities in Rokkasho village

*Source:* Amended from JNFL (2016)

To provide some context, nuclear power was initially supported with the establishment of the First Long-term Plan on Atomic Energy in 1956, which clarified its purpose as ‘producing the further amount of fuel by introducing Fast Breeder Reactor, which can achieve the utility of Uranium resource, and ultimately improve the vulnerable energy supply structure of Japan’ (Atomic Energy Commission, 1956). To this end, the Japan Nuclear Fuel Service (JNFS, subsequently Japan Nuclear Fuel Limited) was established as a public corporation in 1980; one of its first tasks was to identify suitable land for reprocessing, uranium compression, and low-level nuclear waste storage.

Steering this whole process was the Mutsu-ogawara Industrial Development Plan. The Plan initially proposed a massive corridor of petro-chemical facilities and steel mills, with strong agreement from local residents, in order to combat growing levels of poverty by expanding opportunities for employment (Kamata, 2011). However, a lasting consequence of

the oil shocks of the 1970s was greatly reduced demand for industrial land and oil-related industries. Parallel to this problem, the direction of the government's economic policy shifted to an 'energy saving and knowledge-based industry.' An amendment to the Mutsu-ogawara Plan therefore seemed inevitable.

Rokkasho village became attractive as a site because most of the land in the Mutsu-ogawara industrial region was already secured by public or government-friendly organisations. According to a government report, the Mutsu-ogawara region was articulated as having 'suitable conditions to be a mecca of nuclear industry' (Kamata, 2011). Put simply, a perception that the region was already environmentally degraded was seen as an encouraging factor for siting nuclear facilities there (Shimizu, 1992).

In these contexts, the plan for nuclear fuel cycle facilities materialised in the mid-1980s. In July 1984, the Federation of Electric Power Companies of Japan (FEPC) requested that Aomori prefecture and Rokkasho village build uranium compression and manufacturing capabilities, as well as a low level radioactive waste storage and reprocessing facility. In January 1985, Rokkasho local council officially signed an agreement to accept both the facilities (and waste) in their region. Following this decision, Kitamura Masaya, then governor of Aomori prefecture, consented to FEPC's request, so that both geological and coastal projects were initiated in parallel.

However, a year after the agreement, a historical nuclear disaster happened in Chernobyl in 1986, and public and political resistance immediately became a significant obstacle. An anti-nuclear candidate, Mikami Takao, was elected to the House of Councillors in 1989, and Tsuchida Hiroshi, whose views on reprocessing were cautious to moderate (at best), beat the existing head of the village, Furukawa Isematsu, in the December 1989 election. Because of the degree of controversy, the 1991 Aomori prefecture governorship election was called the 'election of the nuclear fuel cycle' within the community (Kamata, 2011). Despite the

heightened polemic, in line with peripheralisation theory, the pro-nuclear candidate, Kimura Masaya, was elected.

Since then, the financial security of Rokkasho village—and its dependence on the nuclear industry—has expanded dramatically, with a staggering amount of financial support under the *Three Power Laws*. In addition, the Fixed Asset Tax from nuclear fuel facilities has accelerated financial prosperity in the village. According to calculations by Rokkasho village (2016) itself, the total amount of support reached approximately ¥5.5 billion (\$49.3 million) and ¥22.23 billion (\$200 million) respectively from 1987 to 2000. As Shimizu (1992) emphasised, ‘the weight of support by national and local government are unimaginably effective.’ Based on this support, the average annual income of residents was recorded as about ¥15 million (\$134,500) in 2017, making them as the richest region in Japan, whereas they were the poorest village in 1970 (Kahoku News, 2017).

At present, Rokkasho village is one of the few regions within Japan to steadfastly promote nuclear power, even after the Fukushima accident. The anti-nuclear movement of the 1980s and 1990s has evaporated. In addition to the initial three facilities, storage for high level nuclear waste and a MOX fuel manufacturer were located in the village in 1995 and 2010, respectively. Notwithstanding the accumulative risk by siting multiple nuclear facilities so close together, and historical anti-nuclear demonstrations, local people tend to vote for pro-nuclear candidates in local elections (Matsuoka, 2016). An interview with a local resident encapsulates the fatalistic aspects of community thinking:

Of course, risks remain regarding the facility. Nevertheless, there are no other choices.

The opposition could not guarantee our everyday life. (Itoh, 2016: 12)

Funabashi *et al.* (2012: 105-106) interpreted this relationship as social or mutual interdependency between the *centre* and *local* geographies of Japan: Rokkasho is dependent on flows of capital, labour, and knowledge from the centre, but the centre is dependent on Rokkasho for handling the backend and more dangerous components of the country's nuclear fuel cycle.

### Conclusions and Implications

Despite the heterogeneity of the four nuclear communities examined (across two very different countries and cultures) and nuclear technology involved (reactors, fuel storage and processing, waste storage), there is a striking commonality among our cases. All saw strong forms of peripheralisation at work, and all show the often hidden socio-political (and at times economic) forces behind nuclear power at the community level. As Table 5 summarizes, all see at least four of the five attributes of peripheralisation as “highly likely” or “likely.” This confirms that peripheralisation is both a perpetual and destructive force.

**Table 5: Qualitative summary of social peripheralisation across the four cases**

	Korea		Japan	
	Ulju	Gyeongju	Futaba	Rokkasho
<b>Geographical remoteness</b>	Moderate	Unlikely	Likely	Likely
<b>Economic Marginality</b>	Likely	Highly Likely	Highly Likely	Highly Likely
<b>Environmental Degradedness</b>	Highly Likely	Highly Likely	Highly Likely	Highly Likely

<b>Political</b>				
<b>Powerlessness</b>	<b>Highly Likely</b>	<b>Highly Likely</b>	<b>Highly Likely</b>	<b>Highly Likely</b>
<b>Cultural</b>				
<b>acceptance</b>	<b>Highly Likely</b>	<b>Highly Likely</b>	<b>Highly Likely</b>	<b>Highly Likely</b>

Source: Author

The role of communities in these processes of peripheralisation is neither impartial, static, nor simple. Whereas Scalise (2015) paints a picture of nuclear power operators pitted against local actors and activists in places such as Japan, our results challenge this view, giving it more nuance and depth. Some communities can come to adopt and embrace nuclear facilities for the job security and stability they bring. This suggests that narratives centred on how nuclear power leads inevitably to local feelings of isolation, loss of agency, and community impotency do not always hold true, a finding reiterated by Venables *et al.* (2009) in their examination of the United Kingdom. Local nuclear-based economies in Japan and South Korea do depend financially on support from governments and utilities, but they come to actively invite such involvement and dependence. Futaba's request for an additional nuclear power plant in 1991 might be an example of this argument, as is Rokkasho's request for a high-level waste facility in 1995 and MOX facility in 2010. The Ulju district in South Korea is also expected to host three additional reactors by 2022, and Gyeongju will be hosting additional waste storage casks by 2024. As such, whilst the initial siting of a facility might be interpreted as one-sided and undemocratic, nuclear activities become societally embedded, with a majority of community members coming to show a fairly homogenous feeling toward nuclear energy and its facilities. Peripheralisation suggests a deeper dynamic by which pro-nuclear attitudes become "locked in" socially and culturally.

These socio-political undercurrents to nuclear power do point the way towards fruitful future research. Apart from the UK (examined by Blowers) and Japan and South Korea (examined here), in what other countries does nuclear peripheralisation occur? Can it occur with other energy technologies, especially capital intensive ones such as hydropower or large-scale coal and natural gas infrastructure, or even wind and solar energy projects? Does it happen in other non-energy industries, or is it unique to the energy sector? Are other nations resistant to it beyond Finland and Sweden? Even more critically, what policy mechanisms can prevent peripheralisation from occurring, and once it does occur, what mechanisms can undo it?

For in essence, peripheralisation suggests that nuclear facilities in Japan and South Korea will invariably migrate to countries and communities that lack the political, social, and economic strength to oppose them. It reminds us that the future of nuclear energy may depend as much on community dynamics, subnational struggles, and contests over local power relations as it does national political instruments and transnational flows of capital and technology.

## **References**

- Agency for Natural Resources and Energy (2010) *Dengenricchiseido no gaiyo* (Outline for power generation region system), METI, Japan (in Japanese)
- Aldrich, D. P. (2008) *Site Fights: Divisive Facilities and Civil Society in Japan and the West*, Ithaca, NY: Cornell University Press.
- Aldrich, D. P. and Fraser, T. (2017). All Politics is Local: Judicial and Electoral Institutions Role in Japans Nuclear Restarts. *Pacific Affairs*, 90(3), pp. 433-457.
- Atomic Energy Commission (1956) *Atomic Energy Commission Monthly Report (1)1*, Atomic Energy Commission.



- Blowers, A. and Leroy, P. (1994) 'Power, Politics and Environmental Inequality: A Theoretical and Empirical Analysis of the Process of 'Peripheralisation'', *Environmental Politics*, 3(2), pp. 197-228.
- Blowers, A. (1999) 'Nuclear waste and landscapes of risk', *Landscape Research*, 24(3), pp. 241-264
- Blowers, A. (2010) 'Why dump on us? Power, pragmatism and the periphery in the siting of new nuclear reactors in the UK', *Journal of Integrative Environmental Sciences*, 7(3), pp. 157-173
- Blowers, A. (2017) *Legacy of Nuclear Power*, Abingdon: Routledge.
- Chae, K. (2004) 'Factors Determining the Acceptance of Nuclear Wastes Disposal Facilities', *Korean Society and Public Administration*, 14(4), pp. 291-309 (in Korean)
- Cho, S. (2007) 'How Does the Democratic Institution Bring the Retreat of Democracy? A Study of the Bureaucratic Reform and Nuclear Waste Depository Policy under the Noh Moo Hyun Government', *Economy and Society*, pp. 139-170 (in Korean)
- Chung, J. and Kim, H., (2009) 'Competition, economic benefits, trust, and risk perception in siting a potentially hazardous facility', *Landscape and Urban Planning*, 91, pp. 8-16.
- Dusinberre M. and Aldrich, D.P. (2011) 'Hatoko Comes Home: Civil Society and Nuclear Power in Japan', *The Journal of Asian Studies*, 70(3), pp. 683–705.
- FEPC (2016) *Koleveru housyaseihaikibutu henkanto ukeirezisiseki* (Report on return and carry of high-level nuclear waste),  
[http://www.fepc.or.jp/nuclear/haikibutsu/hIgh\\_level/yusou/sw\\_index\\_01/](http://www.fepc.or.jp/nuclear/haikibutsu/hIgh_level/yusou/sw_index_01/) (Accessed 12 October 2017; in Japanese)
- Fukushima Minpo Press (2013) *Fukushimato genpatsu yuchikara daisinsaihen 50nen* (Fukushima and nuclear: 50 years history from invitation to disaster), Fukushima Minpo Press: Fukushima (in Japanese)

- Funabashi, H. (2012) 'Why the Fukushima Nuclear Disaster is a Man-made Calamity', *International Journal of Japanese Sociology*, 21(1), pp. 65-75.
- Funabashi, H. Iijima, N. and Hasegawa, K. (2012) *Kakunenryosaikurusisetuno syakaigaku* (Sociology of nuclear fuel cycle facilities), Tokyo: Yukakusya (in Japanese)
- Gerring, J. (2004) 'What Is a Case Study and What Is It Good for?', *American Political Science Review*, 98(2), pp. 341-354
- Gerring, J. (2005) *Case Study Research*, New York: Cambridge University Press.
- Ha, K. (2016) 'Disasters can happen to anybody: The case of Korea', *Environmental Impact Assessment Review*, 57, pp. 1-9.
- Hagami, T. (2011) 'Genpatsudanomiha issuinoyumeka (Is nuclear power a futile dream)', *Sekai*, 812, pp. 185-193 (in Japanese)
- Han, S. (2012) 'The formation of a local nuclear power plant regime and the confrontation of the civic governance: Focusing the case of Sin-Gori nuclear power plant in Ulsan', *ECO*, 16(1), pp. 45-68 (in Korean)
- Hwang, S. (1998) 'Bacjingu Ulsansi uljugunsu wonjeonyuchi barkhyeo (Governor Park JinGu announced to invite nuclear reactors to Ulju)', *The Chungang Daily*, 5 November, <http://news.joins.com/article/3720264> (in Korean)
- Hwang, G. (2016) 'Geongjusi donghean wonjaryokclusteo hubdosi nalgejit (Gyeongju, dreams to build nuclear cluster)', *Kyongbuk Ilbo*, 17 March, <http://www.kyongbuk.co.kr/?mod=news&act=articleView&idxno=953891> (in Korean)
- IAEA (2017) *Operational & Long-Term Shutdown Reactors*, PRIS, IAEA, <https://www.iaea.org/PRIS/WorldStatistics/OperationalReactorsByCountry.aspx> (Accessed: 12 October 2017)
- Itoh, N. (2016) 'Kakunenryosaikuru sanzuyunen rokkashomurano genjyo (Situation of Rokkasho, 30 years with nuclear fuel cycle)', in *Symposium Situation and Challenge of*

- Aomori prefecture, Shimokita 'atomic' peninsula*, Institute of Social Sciences Senshu University, pp. 8-13 (in Japanese)
- JAIF (1970) *Chiikisyakaito gensiryokuhatsudensyo* (Local community and nuclear power plant), Committee on experts of siting (in Japanese)
- Jasanoff, S. and Kim, S. (2009) 'Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea', *Minerva: A Review of Science, Learning and Policy*, 47(2), pp. 119-146.
- Jang, I. and Lee, W. (2008) 'Change in policy on the location for radioactive waste disposal site and compensation mechanism', *Social Science Research Review*, 24(1), pp. 63-88 (in Korean)
- Johnstone, P., Stirling, A.C. and Sovacool, B.K. (2017) 'Policy Mixes for Incumbency: Exploring the destructive recreation of renewable energy, shale gas 'fracking,' and nuclear power in the United Kingdom,' *Energy Research & Social Science*, 33, pp. 147-162.
- JNFL (2016) *Gensinenryosaikurusisetugaiyo* (Outline of nuclear fuel cycle facility), *Japan Nuclear Fuel Limited*, <http://www.jnfl.co.jp/ja/company/facility/> (Accessed 12 October 2017; in Japanese)
- JNFL (no date) *Nihongennennenno ayumi* (History of JNFL), *Japan Nuclear Fuel Limited*, <http://www.jnfl.co.jp/ja/company/history/> (Accessed: 12 October 2017; in Japanese)
- Kahoku News (2017) 'Shotokukyunenrenzoku topu 1557manen (Rokkasho has been the richest region for nine years)', *Kahoku News*, 2 April, [http://www.kahoku.co.jp/tohokunews/201704/20170402\\_21040.html](http://www.kahoku.co.jp/tohokunews/201704/20170402_21040.html) (in Japanese)
- Kamata, S. (2011) *Rokashomurano kiroku kakunenryosaikurukichino sugao* (Memory from Rokkasho village, situation of nuclear fuel cycle facility), Tokyo: Iwanama Gendai Bunko (in Japanese)

- Karlsson, B. G. (2012) 'Atoms: nuclear estrangement from Chernobyl to India'. In Alf Hornborg, Brett Clark, and Kenneth Hermele (Eds). *Ecology and Power* (London: Routledge), pp. 239-249.
- KHNP (2016) Wonjaryokbaljeon bakseo 2016 (Nuclear Power Generation 2016), *Korea Hydro and Nuclear Power*, MOTIE, Korea (in Korean)
- Kim, C. (2016) 'Singori 5·6hogi Ulsanjiyeok geongje gidegam (Shin Kori 5 and 6 reactors, boost expectation in Ulsan economy)', *Korea Times*, 2 June, <http://www.hankookilbo.com/v/135c4e37581e4e8aa65c630360a1eee1> (in Korean)
- Kim, Y. and Ahn, J. (2004) 'Effects of Heated Effluents on the Intertidal Macroalgal Community near Wolseong, the East Coast of Korea', *Algae*, 21(4), pp. 453-461 (in Korean)
- Kim, Y. and Park, P. (2005) 'Geongju gyoukhwangyung geson dong kungide hwakjeong-talrakjiyoeo hwibi (Gyeongju expects to review education system by invite nuclear facility)', *Munhwa Ildo*, 3 November, <http://www.munhwa.com/news/view.html?no=20051103010105431290020> (in Korean)
- Koike, T. (2013) Genpatsuritchi jichitai no zaisei • keizaimondai (Financial and economy issues in nuclear-involved regions), Issue Brief N. 767, *National Diet Library*, Japan (in Japanese)
- Kong, K. and Lee, H. (2017) Stalled Korea nuclear reactors show risks to betting on Moon, *Bloomberg Politics*, 20 October 20, <https://www.bloomberg.com/news/articles/2017-10-19/stalled-nuclear-reactors-show-risks-to-betting-on-korea-s-moon>
- Kono, N. (2002) 'Gensiryokusisetsuno ritchito chiikinougyo – toukeito zireiga kataru 'funo soukan' (Relationship between siting of nuclear related facilities and local agriculture: Statistics and case study narrate 'negative correlation')', *Ibaraki University Bulletin*, 72, pp. 1-18 (in Japanese)

- Lee, T. (2003) 'Singoriwonjeon gunsulsaop ganghangchujin begungun (own translation: Background of Shin Kori nuclear business)', *Kyungsang Daily*, 14 April, <http://ksilbo.co.kr/news/articleView.html?idxno=30261> (in Korean)
- Lee, C. (2016) 'Goribuji senjeng iyagi (Story of siting of Kori reactor)', *Nuclear industry*, 36(5), pp. 28-39 (in Korean)
- Lee, E. (2017) 'Sunjunhan uljugunmini degachireo singori5·6hogi bakjihwa zuldebandea sangungtujeng (Opposition to cancellation of Shin Kori 5 and 6 reactors, people in Ulju show strict position)', *Korea Joongang Daily*, 30 May, <http://news.joins.com/article/21620412> (in Korean)
- Lee, G. (2017) 'Wonjaryok Runessanseseo Hecheowl sidearo (From Nuclear Renaissance to Era of decommission)', *The Hankyoreh*, 18 June, [http://www.hani.co.kr/arti/science/science\\_general/799208.html](http://www.hani.co.kr/arti/science/science_general/799208.html) (in Korean)
- Leam, S. (2015) 'Nuclear waste disposal policy and governance in South Korea', *Korean Governance Review*, 22(3), pp. 167-188 (in Korean)
- Liebersohn, S. (1991) 'Small N's and Big Conclusions: An Examination of the Reasoning in Comparative Studies Based on a Small Number of Cases', *Social Forces*, 70(2), pp. 307-320
- Matsuoka, S. (2016) *Aomoriken rokkashomura • kakunenryosaikuru kanren sisetsuno syakaizyuyouseini kansuru chousahoukokusyo* (Report on social acceptance of nuclear fuel cycle facilities in Rokkasho village), Waseda University Graduate School of Asia-Pacific Studies (in Japanese)
- MOTIE (2015) Nuclear White book, *MOTIE*, Korea (in Korean)
- Nam, H. (2013) *Geongjubanpejang yuchiihuui galdung jesengsane gwanhan yeongu* (Research on reproduction of conflicts after the siting of radioactive waste disposal facility in Gyeongju), Master dissertation, Korea University (in Korean)

- Nocut News (2006) 'Seongteak 5·31 huboja chochung toronhoi <5>uljugunsu hubo (Discussion with candidates of Governor of Ulju)', 29 May, <http://www.nocutnews.co.kr/news/156615> (Accessed 12 October 2017; in Korean)
- Nucci, M. R. D. and Brunnengraber, A. (2017) 'In Whose Backyard? The Wicked Problem of Siting Nuclear Waste Repositories', *European Policy Analysis*, 3(2), pp. 295-323.
- Otsuki, K. (2016) 'Procedural equity and corporeality: Imagining a just recovery in Fukushima', *Journal of Rural Studies*, 47, pp. 300-310
- Parkhill, K. A., Nick F. P., Karen L. H., Peter S. and Dan V. (2010) 'From the familiar to the extraordinary: local residents' perceptions of risk when living with nuclear power in the UK', *Transactions of the Institute of British Geographers*, 35(1), pp. 39-58
- Petticrew, M. and Roberts, H. (2006) *Systematic Reviews in the Social Sciences: A Practical Guide*, New York: John Wiley & Sons.
- Rokkasho Village (2016) *Dengensanpoukouhukin zissekirigaku* (Result of supports from Three Power Laws), <http://www.rokkasho.jp/index.cfm/7,890,17,html> (Accessed 12 October 2017; in Japanese)
- Scalise, P. J. (2015) 'In Search of Certainty: How Political Authority and Scientific Authority Interact in Japan's Nuclear Restart Process'. In: Michael H. and John K. (eds.) *Policy Legitimacy, Science, and Political Authority: Knowledge and Action in Liberal Democracies*. New York: Routledge.
- Seawright, J. and John G. (2008) 'Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options', *Political Research Quarterly*, 61, pp. 294-308
- Shimizu, S. (1992) 'Dengenritchisokusinzaiseino chiikiteki tenkai (Regional development and economic support)', *Journal of the Center for Regional Affairs Fukushima University*, 3(4), pp. 611-634 (in Japanese)

- Shimizu, S. (2011) *Genpatsuni nao chiikino miraiwo takuseruka —Fukushimaziko riekiyudou sisutemuno hatanto chiikisaiseiheno michi* (Can we trust nuclear power: Fukushima accident and regional economy), Tokyo: Jichitai Kenkyusya.
- Solomon, B. D., Mats A and Urban S. (2010) 'Three Decades of Social Science Research on High-Level Nuclear Waste: Achievements and Future Challenges', *Risk, Hazards & Crisis in Public Policy*, 1(4), pp. 13-47.
- Sovacool, B.K. (2010) 'A Critical Evaluation of Nuclear Power and Renewable Energy in Asia', *Journal of Contemporary Asia*, 40(3), pp. 369-400.
- Sovacool, B.K. and Valentine, S.V. (2012) *The National Politics of Nuclear Power: Economics, Security, and Governance*, London: Routledge.
- Takahashi, T. (2012) *Giseino sisutemu Fukushima & okinawa* (System of sacrifice: Fukushima and Okinawa), Tokyo: Shueisya Shinsho.
- TEPCO (1983) *Toukyodenryoku 30nensi* (30 years history of TEPCO), Tokyo: Dainihon Publishing (in Japanese)
- Ulju Development Institute (2016) '2030 Uljugun JungjangibaljeonGyehwack (2030 Ulju middle-long term development strategy)', *Ulju Development Institute*, Korea (in Korean)
- Ulsan Press (2007) 'Singoriwonjeon 3·4hogi geonsul sanggye bojanghara (Assure our life, construction of Shin Kori 3 and 4 reactors)', 2 September, <http://www.ulsanpress.net/news/articleView.html?idxno=17768> (Accessed 12 October 2017; in Korean)
- Valentine, S.V. and Sovacool, B.K. (2010) 'The Socio-Political Economy of Nuclear Power Development in Japan and South Korea', *Energy Policy*, 38(12), pp. 7971-7979.
- Venables, D., Nick P., Peter S., Karen H., and Karen P. (2009) 'Living with Nuclear Power: A Q-Method Study of Local Community Perceptions', *Risk Analysis*, 29(8), pp. 1089-1104.

- Yamakawa, M. (1987) 'Genpatsuritchisuisinto chiikiseisakuno tenkai (Development on nuclear siting and regional policy)', *Shogakuronsho*, Fukushima University, 55(2), pp. 1-23 (in Japanese)
- Yang, R. (2016) *Risk Perception and Social Construction of Risk in the Neighborhood nearby Nuclear Power Plant: Focused on the Cases of Gori, Yeonggwang and Uljin*, Ph.D dissertation, Chonnam National University (in Korean)
- Yoshioka, H. (2011) *Gensiryokuno syakaisi sono nihonteki tenkai* (Sociobiological history of nuclear power in Japan), Tokyo: Asahi Shinsho (in Japanese)
- Yun, S. (2006) 'Looking at the Selection Process of Low and Medium Level Radioactive Waste Disposal Site from an Environmental Justice Perspective', *The Korean Association For Environmental Sociology*, 10(1), pp. 7-42 (in Korean)
- Yun, S., Kim, S. and Jeong, M. (2010) 'Similarities and Differences of Development Paths of the Nuclear Technological Systems of Japan and Korea: Focused on the Concepts of Momentum and Reverse Salients', *ECO*, 15(2), pp. 147-195 (in Korean)
- Zonabend, F. (1993) *The Nuclear Peninsula*, Cambridge: Editions de la Maison des Science de l'Homme/Cambridge University Press.



Appendix I: Keyword Searches for the Systematic Review

	English	Korean	Japanese
<b>Ulju</b>	Kori nuclear, Kori nuclear Korea, shin Kori nuclear, nuclear facility Kori, Shin Kori, Ulju, Gijang	고리원전, 고리 원자력 발전소, 신고리, 신고리 원전, 울주 원전, 울주군 원자력 발전소	韓国 古里 原發、古里 原子力發電所、韓国 原子力、韓国 原發
<b>Gyeongju</b>	low/middle level of radioactive waste korea, nuclear waste, spent fuel waste, Gyeongju nuclear korea,	경주 원자력, 경주 핵 폐기물, 경주 방폐장, 경주 방사선 폐기물, 경주 원전, 경주 중저준위 방폐장	韓国 核廃棄物、低レベル 核廃棄物 韓 国、キュンジュ 原子 力、キュンジュ 原 發、キュンジュ 原子 力 廃棄物
<b>Futaba</b>	Fukushima nuclear power, Futaba nuclear, Futaba Fukushima nuclear, nuclear history Futaba, Fukushima history	후쿠시마 원전, 후쿠시마 원자력, 후쿠시마 원자력 발전소, 일본 후쿠시마 원전, 후쿠시마 후타바, 후타바 원전, 후쿠시마 원전 역사	福島原發、双葉、双葉 原發、双葉 原子力、 福島第一原子力發電 所、双葉 原子力 歴 史
<b>Rokkasho</b>	Rokkasho nuclear, reprocessing facility japan, reprocessing Rokkasho, Aomori nuclear, nuclear fuel cycle japan, reprocessing japan, nuclear village Rokkasho	일본 롯카쇼, 일본 재처리 시설, 일본 원자력 재처리, 일본 롯카쇼 원전, 일본 재처리, 일본 원자력 핵연료 사이클, 롯카쇼 원자력 역사	六ヶ所村、再処理施 設、六ヶ所 原發、六 ヶ所 原子力、 核燃 料サイクル

**Appendix 2.** List of 71 final research materials collected via the systematic review  
[ULJU]

Cha, C. (2017) ‘고리원전 주변 사람들의 생활경험과 마을공동체 (own translation: life experience and local community near Kori nuclear power plants)’, *Journal of Koreanology*, 2(62), pp. 375-404. (in Korean)

Choi, S. (2009) ‘원자력발전소 주변지역 지원정책의 문제점과 발전방향 모색 - 고리원전 지역을 중심으로 (Exploring Problems of the Support Problem for the Adjacent Region of Nuclear Power Plant Site: Focused on Kori Region)’, *The Korean Journal of Local Government Studies*, 13(3), pp. 223-244.

Han, S. (2012) ‘핵 발전소 입지를 둘러싼 지방 레짐의 형성과 시민사회 거버넌스의 대응- 울산광역시 울주군 신고리 원전의 유치 사례 (The formation of a local nuclear power plant regime and the confrontation of the civic governance: Focusing the case of Sin-Gori nuclear power plant in Ulsan)’, *ECO*, 16(1), pp. 45-68. (in Korean)

Kim, G., (2008) ‘비선회시설 건설정책에서의 딜레마 형성과 해소에 관한 연구: 원자력발전소 건설정책을 중심으로 (own translation: Research on construction and relief of Dilemma in NIMBY facility: in case of nuclear power plant)’, *Journal of Governmental Studies*, 14(4), pp. 83-121. (in Korean)

Kim, C., (2013) ‘원전 소재 지자체가 주도하는 원자력안전협정체결 우선 필요’ (own translation: Require nuclear safety agreement by nuclear-possessed regions), *Busan Development Forum*, 142, pp. 40-49. (in Korean)

Kim, J. (2013) *원전 관련 정보가 인식 형성에 미치는 영향에 관한 연구: 부산 기장군 고리원전 지역주민을 대상으로* (How Nuclear Related Information Affects to the Perception Formation: Focusing on the Residents at the Gori Nuclear Power Plant), Master Dissertation, DongEui University. (in Korean)

Kim, J. (2015) *원자력 에너지 정책 갈등에 대한 이해당사자의 프레임 분석: 원전지역 주민을 중심으로* (Understanding conflict frames of stakeholder regarding nuclear energy policy), Master Dissertation, ChungAng University. (in Korean)

Lee, C. (2016a) ‘고리 부지 선정 이야기 (own translation: Story of siting of Kori reactor)’, *Nuclear industry*, 36(5), pp. 28-39. (in Korean)

Sulmin, (2017) *원자력 수용성에 대한 비교 분석: 한빛, 고리 원전 지역을 중심으로* (own translation: Analysis on nuclear acceptance: in case of Hanbit and Kori), Master Dissertation, Ajou University. (in Korean)

Woo, C. (2010) *비선회시설 입지선정상의 갈등연구: 울산광역시 울주군 서생면 원자력발전소 설립을 중심으로* (own translation: Research on NIMBY facility: in case of nuclear reactors in Ulju), Master Dissertation, Ulsan University. (in Korean)

Yang, R. (2016) *원전주변지역 주민들의 위험인식과 위험의 사회적 구성- 고리, 영광, 울진지역을 중심으로* (Risk Perception and Social Construction of Risk in the Neighborhood nearby Nuclear Power Plant: Focused on the Cases of Gori, Yeonggwang and Uljin), Ph.D dissertation, Chonnam National University. (in Korean)

Yun, S. and Oh, E. (2006) ‘한국 원자력 발전정책의 사회적 구성 - 원자력기술의 도입 초기 (1954~1965 년)를 중심으로 (A Study on the Social Construction of the Nuclear Power Generation Policy in Korea: Focused on the Introduction Processes of Nuclear Technology)’, *Journal of Environmental Policy and Administration*, 14(1), pp. 37-74. (in Korean)

[GYEONGJU]

Choi, J., (2007) *Nuclear waste facility siting in Korea: the relations between government compensation, distance, and the public's judgement of risk*, Ph.D. Dissertation, University at Albany, State University of New York.

Chung, J., Kim, H. and Rho, S., (2008) 'Analysis of local acceptance of a radioactive waste disposal facility', *Risk Analysis*, 28(4), pp. 1021-1032.

Shin, E., Ha, G. and Kim, H., (2010) '공공갈등관리에 대한 시스템적 접근 : 방폐장 입지선정 사례를 중심으로 (A Systems Approach to the Public Conflict Management: Focusing on the Radioactive Waste Disposal Site Choice)', *Dispute resolution studies review*, 8(1), pp. 173-199. (in Korean)

Lee, B. and Kim, U., (2010) '방폐장 준공지연과 그 결과에 대한 고찰 (own translation: Thought on delay and result of radioactive waste storage)' *Korean Radioactive Waste Society*, pp. 21-22. (in Korean)

Kim, Y., (2005) '방폐장입지선정과정의 정책네트워크 분석: 경주지역 유치활동을 중심으로 (own translation: Analysis on policy network on process of siting of radioactive waste disposal storage: in case of Gyeongju)', *Korean Policy Sciences Review*, 9(4), pp. 287-316. (in Korean)

Kim, H. (2007) *방사성폐기물처리장 입지 갈등관리의 성패요인에 관한연구: 부안·경주 사례를 중심으로* (A Study on the Conflict Management in Locating Radioactive Waste Disposal Facilities in Korea. - Focused on the Cases of Buan-Gun and Gyeongju-Si), Master Dissertation, Seoul City University. (in Korean)

Kim, M. (2016c) *도구적 위험 거버넌스의 한계: 경주 방폐장 사례를 중심으로* (The limits of Instrumental Risk Governance: the Case of Gyeongju Raioactive Waste Repository)', Master Dissertation, Seoul National University.

Kim, E., (2011) '경주 방폐장과 지역 주민들의 삶 (own translation: Gyeongju radioactive waste disposal facility and the life of local residents: Competing discourses and change of 'locality'', *Korean Association of Regional Studies*, 19(3), pp. 21-46. (in Korean)

Kim, J. (2010) *한국의 심의민주주의의 실험과 한계- 방사성폐기물처분장 유치결정 사례를 중심으로* (own translation: Experiment and limitation of deliberative democracy in Korea: in case of siting of radioactive waste disposal storage), Master dissertation, Korea University. (in Korean)

Huh, Y., (2013) *Justice, democracy and the siting of nuclear waste repositories: the Buan and Gyungju cases of South Korea*, Ph.D. Dissertation, Colorado State Universtiy.

Jang, S. (2014) *After the Siting: Reconstructing the Low-Level Radioactive Waste Disposal Policy in Korea*, Ph.D. Dissertation, Daegu University.

Jang, I. and Lee, W. (2008) '방사성폐기물처리장의 입지정책의 변화와 보상메커니즘 (Change in policy one the location for radioactive waste disposal site and compensation mechanism)', *Social Science Research Review*, 24(1), pp. 63-88. (in Korean)

Jung, J. and Kim, H. 'Competition, economic benefits, trust, and risk perception in siting a potentially hazardous facility', *Landscape and Urban Planning*, 91(1), pp. 8-16.

Kwon, J. (2015) *정책네트워크를 통한 방사성폐기물 처리장 입지갈등 분석: 부안과 경주비교* (A Comparative Analysis of Policy Networks and Social Conflicts over Radioactive Waste Facilities Siting: Buan vs. Gyeongju), Master dissertation, Hankuk University of Foreign Studies.

Lee, H., (2009) '첫 단추부터 잘못 끼우면 경주 방폐장처럼 된다. - 경주 방폐장을 둘러싸고 꼬리에 꼬리를 물고 나타는 문제들 (own translation: Constant issues on Gyeongju radioactive waste disposal storage)', *Citizen Science*, Volume of September/October, pp. 1-6. (in Korean)

Lee, S. and Chung, M., (2012) '비선회시설 입지갈등 과정의 메타거버넌스 분석 (own translation: Meta-analysis on process of NIMBY facilities)', *Journal of local government studies*, 24(2), pp. 67-94. (in Korean)

Lee, B., (2014) *원자력 신뢰가 먼저다* (own translation: Trust comes first on Nuclear power), Seoul: Hanshouse Publisher. (in Korean)

Moon, J. and Cho, G., (2011) 'Investigation of Perception of Nuclear Power by the Local Residents Adjacent to Nuclear Installations', *Journal of the Korean Radioactive Waste Society*, 9(3), pp. 181-189.

Yamaguchi, Y., Komatsuzaki, S. and Horii, H., (2011) 'Political process analysis of radioactive waste disposal site selection in South Korea', *Sociotechnica*, 8, pp. 60-73.

Yun, S. (2006) '환경정의 관점에서 본 중·저준위 방사성 폐기물 처분장 입지선정과정 (Looking at the Selection Process of Low and Medium Level Radioactive Waste Disposal Site from an Environmental Justice Perspective)', *The Korean Association For Environmental Sociology*, 10(1), pp. 7-42. (in Korean)

#### [FUTABA]

Funabashi, H. (2012) 'Why the Fukushima Nuclear Disaster is a Man-made Calamity', *International Journal of Japanese Sociology*, 21(1), pp. 65-75.

Itoh, H. (2011b) '原発立地自治体における原発依存脱却への課題 (own translation: Challenge for phasing-out from nuclear dependence in nuclear-involved communities)', *Municipal Research*, 173, pp. 16-23. (in Japanese)

Jones, C. F., Loh, S. and Sato, K. (2013) 'Narrating Fukushima: Scales of a Nuclear Meltdown', *East Asian Science, Technology and Society*, 7(4), pp. 601-623.

Kainuma, H. (2010) '原子カムラの秩序はいかにして可能か (own translation: How is social order possible in a nuclear village)', *Sociologos*, 34, pp. 105-124. (in Japanese)

Kainuma, H. (2011) 「フクシマ」論 原子カムラはなぜ生まれたのか (own translation: 'Fukushima' theory, how nuclear village was created), Tokyo: Seidosha. (in Japanese)

Koike, T. (2013) 原発立地自治体の財政・経済問題 (own translation: Financial and economy issues in nuclear-involved regions), Issue Brief N. 767, National Diet Library, Japan. (in Japanese)

Miyawaki, K. (2014) '政府の原発事故対応と原発立地自治体住民の原発態度に関する考察 (own translation: Thought on governments' response and change of regional residents' attitudes toward nuclear power plant)', *Studies in political science and economics*, 50(3), pp. 681-717. (in Japanese)

National civil Onbuzman conference (2011) 原発利益誘導によってゆがめられた地方財政 (own translation: Skewed regional economy by nuclear power plant), National civil Onbuzman conference. (in Japanese)

Shimizu, S. (1992) '電源立地促進財政の地域的展開 (own translation: regional development and economic support)', *Journal of the Center for Regional Affairs Fukushima University*, 3(4), pp. 611-634. (in Japanese)

Shadrina, E. (2012) 'Fukushima Fallout: Gauging the Change in Japanese Nuclear Energy Policy', *International Journal of Disaster Risk Science*, 3(2), pp. 69-83.

Shimizu, S. (2011a) 原発になお地域の未来を託せるか—福島原発事故 利益誘導システムの破綻と地域再生への道 (own translation: Can we trust nuclear power: Fukushima accident and regional economy), Tokyo: Jichitai Kenkyusya.

Shimizu, S. (2011b) 原発とは結局なんだったのか: いま福島で生きる意味 (own translation: What was the nuclear power, meaning of living in Fukushima), Tokyo: Tokyo Newspaper Press.

Shimizu, S. (1999) NIMBY シンドローム考: 迷惑施設の政治と経済 (own translation: NIMBY Syndrome: Politics and economics of locally unwanted facility), Tokyo: Tokyo University Press.

Shimizu, S. (2014) '原子力発電の財政学 (own translation: Finance of nuclear generation)', *The Shogaku Ronshu*, 82(4), pp. 121-130.

Sugahara, S. and Shiroyama, H. (2011) ‘原子力施設をめぐる自治体関与の日仏比較分析 (A comparative analysis between France and Japan on local government's involvement in nuclear safety governance)’, *Journal of Japan Society of Civil Engineers*, 67(4), pp. 441-454. (in Japanese)

Tahara, S. (1979) ‘東京電力 (株) 福島第一原子力発電所 サービスホール (Service hall in Fukushima Daiichi nuclear power plant, TEPCO)’, *Journal of the Atomic Energy Society of Japan*, 21(4), pp. 332-336. (in Japanese)

Tahara, S. (2011) *ドキュメント 東京電力 福島原発誕生の内幕* (Background of birth of Fukushima), Tokyo: Bunshun Bunko. (in Japanese)

Takahashi, T. (2012) *System of sacrifice: Fukushima and Okinawa*, Tokyo: Syueisya.

Takasu, H. (2013) ‘福島原発震災と地域社会 (own translation: Fukushima Nuclear Power Plant and Local community)’, *Social Policy*, 4(3), pp. 5-17. (in Japanese)

Yamakawa M. (1987) ‘原発立地推進と地域政策の展開 1 and 2 (own translation: Development on nuclear siting and regional policy 1 and 2)’, *Shogakuronsho*, Fukushima University, 55(2), pp. 1-23. (in Japanese)

## [ROKKASHO]

Akimoto, K. (2003) *むつ小川原開発の経済分析—「巨大開発」と核燃料サイクル事業—* (own translation: Economic review on Mutsu-ogawara development —'large-scale development' and nuclear fuel cycle business), Tokyo: Soufusha. (in Japanese)

Akimoto, K. and Kanda, K. (2012) *むつ小川原開発と六ヶ所村漁業: 港湾建設漁業補償と核燃料サイクル海域調査をめぐる* (own translation: The nuclear fuel recycling business and the economic background of the fishermen of Rokkasho Village), Research report, faculty of Life Science, Hirosaki University, (4), pp. 109-123. (in Japanese)

Ando, T. (2014) *Estimating the effects of nuclear power facilities on local income levels: A quasi-experimental approach*, Working Paper 2013:3, Uppsala University, pp. 1-44.

Chino, T. (2005) ‘核燃料サイクル施設と住民意識: 青森県六ヶ所村における住民意識調査報告 (own translation: Local survey on Rokkasho village: nuclear fuel cycle)’, *The Japan Association for Environmental Sociology*, 11, pp. 253-261. (in Japanese)

Dauvergne, P. (1993) ‘Nuclear Power Development in Japan: "Outside Forces" and the Politics of Reciprocal Consent’, *Asian Survey*, 33(6), pp. 576-591.

Funabashi, H. (2004) *むつ小川原開発及び核燃料サイクル施設建設の歴史と六ヶ所村住民意識の概要* (own translation: Outline of local survey in Rokkasho, history and local perception of Mutsu-ogawara development), Institute for sustainability, Hosei University, pp.1-19. (in Japanese)

Funabashi, H. Iijima, N. and Hasegawa, K. (2012) *核燃料サイクル施設の社会学* (own translation: Sociology of nuclear fuel cycle facilities), Tokyo: Yukakusya. (in Japanese)

Itoh, N. (2016) ‘核燃料サイクル30年 六ヶ所村の現状 (own translation: Situation of Rokkasho, 30 years with nuclear fuel cycle)’, in *Symposium Situation and Challenge of Aomori prefecture, Shimokita 'atomic' peninsula*, Institute of Social Sciences Senshu University, pp. 8- 13. (in Japanese)

Kamata, S. (2011) *六ヶ所村の記録——核燃料サイクル基地の素顔 1 and 2* (own translation: Memory from Rokkasho village, situation of nuclear fuel cycle facility 1 and 2), Tokyo: Iwanama Gendai Bunko. (in Japanese)

Kamanaka, H. (2009) *核燃料サイクルの何が問題か* (own translation: What is problem of nuclear fuel cycle), *Urban Issue*, 100(11), pp. 51-19. (in Japanese)

- Kono, N. (2002) ‘原子力施設の立地と地域農業--統計と事例が語る「負の相関」 (own translation: Relationship between siting of nuclear related facilities and local agriculture: Statistics and case study narrate ‘negative correlation’)', *Ibaraki University Bulletin*, 72, pp. 1-18. (in Japanese)
- Matsuoka, S. (2016) 青森県六ヶ所村・核燃料サイクル関連施設の社会的受容性 に関する調査報告書 (own translation: Report on social acceptance of nuclear fuel cycle facilities in Rokkasho village), Waseda University Graduate School of Asia-Pacific studies, pp. 1-21 [Online]. Available at: <http://www.waseda.jp/prj-matsuoka311/material/rokasyoreport.pdf> (Accessed: 28 August 2017). (in Japanese)
- Mitsumoto, N. (2011) ‘青森県六ヶ所村「エネルギーの村・六ヶ所」 (own translation: ‘Energy Village’ Rokkasho, Aomori)', *Journal of humanities and social sciences: Fukuoka University*, 20(6), pp. 89-102. (in Japanese)
- Muramoto, K. (2014) ‘周辺からの記憶 (own translation: Memory from the margin)', in *17th Symposium of Japanese Society of Community Psychology*, pp. 168-179. (in Japanese)
- Otsubo, S. and Miyanaga, T. (2013) 環境・地域・エネルギーと原子力開発～青森県の未来を考える (own translation: Environment, Local, Energy and Nuclear development: future of Aomori prefecture), Aomori: Hirosaki University Press. (in Japanese)
- Otsubo, S. (2011) '原子力開発地域での地域づくり学習: 福島原発事故後の青森県の事例から (Some Learning Tasks in the Inhabitants' Movement of Anti-Nuclear Fuel Cycle Facilities Construction)', *Bulletin of Hirosaki University*, 106, pp. 31-46. (in Japanese)
- Takagi, J. (2003) 核燃料サイクル施設批判 (own translation: Critics on nuclear fuel cycle), Tokyo: Nanatsunomori Syokan. (in Japanese)
- Tsukahara, A. (2006) 核燃料サイクル20年の真実—六ヶ所村再処理工場始動へ (own translation: Truth of 20 year-period of nuclear fuel cycle: in case of Rokkasho reprocessing facilities), Tokyo: Electric Newspaper Books. (in Japanese)